

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

LG. PHILIPS LCD CO., LTD.,)	
)	
Plaintiff,)	C.A. No. 05-292 (JJF)
)	
v.)	
)	
TATUNG COMPANY;)	
TATUNG COMPANY OF AMERICA, INC.;)	
CHUNGHWA PICTURE TUBES, LTD.;)	
AND VIEWSONIC CORPORATION,)	
)	
Defendants.)	

**DECLARATION OF DR. WEBSTER E. HOWARD IN SUPPORT
OF DEFENDANTS' OPENING BRIEF OF THEIR
PROPOSED CLAIM CONSTRUCTIONS**

DECLARATION OF DR. WEBSTER E. HOWARD

I, Webster E. Howard, Ph.D., state and declare as below:

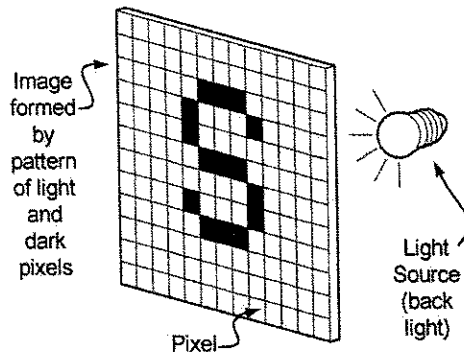
1. I am an independent consultant specializing in electronic display technology. I received a Bachelors of Science degree in Physics from Carnegie-Mellon University in 1955, and a Ph.D. in Physics in 1962 from Harvard University. I have worked at IBM T. J. Watson Research Center for over three decades, where I advanced from a research staff member to senior manger of the Flat Panel Display Technologies Department in IBM Research. I have authored fifty-six (56) scientific papers, and have sixteen (16) patents issued to my name. I am recipient of numerous awards for professional achievements. Details of my education, training, and experiences are set forth in my curriculum vitae, attached as Exhibit A to this Declaration. A list of my patents and publications is included therein. I have been retained by Defendants Chunghwa Picture Tubes, Ltd., Tatung Company, Ltd., and Tatung America Inc. (collectively, "CPT") to provide technical consultation in connection with this action. I make this declaration in support of Defendants' Opening Brief of Their Proposed Claim Constructions.
2. I have reviewed the U.S. Patent No. 5,019,002 ("the '002 patent") and its prosecution history. I have personal knowledge and am familiar with the technology relating to and claimed by the '002 patent. I have also reviewed the interpretation of the claim language provided by counsel of Plaintiff.

Background Technology

3. To date there are a variety of types of flat panel displays, including, among others, liquid crystal displays (LCDs), plasma displays, and light emitting diode displays. The '002 patent is primarily related to LCDs. Unlike other types of displays, an LCD operates by controlling the amount of light transmitted from a back light as opposed to emitting light from individual pixels.
4. An LCD panel has two sides, a frontplane and a backplane. The frontplane and backplane are formed from two sheets of glass, known as substrates in the display industry. Sandwiched between the two glass substrates is a thin film of liquid crystal.

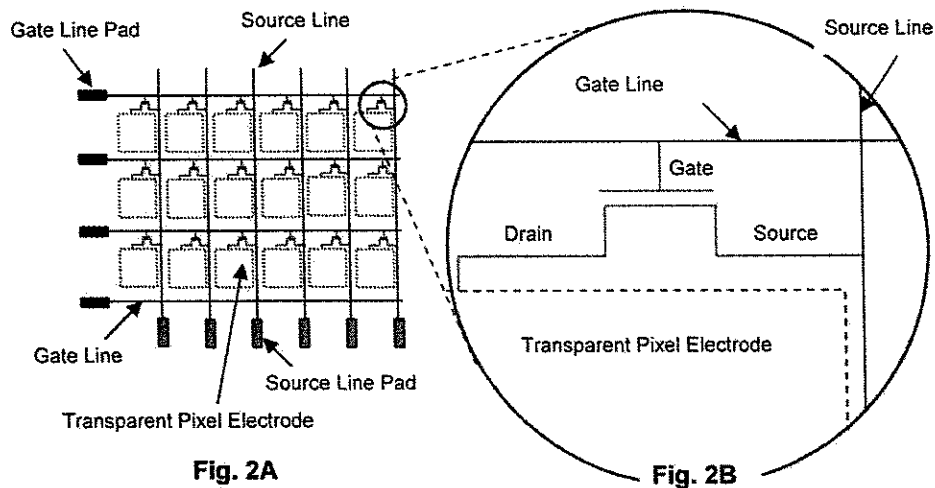
5. The basic units of the display surface are pixels, the tiny picture elements which, collectively, render a visible image on the display. The brightness of each pixel is determined by the amount of light transmitting through the liquid crystal at that pixel.

Figure 1 is an illustration of how an image is rendered by adjusting the brightness of selected pixels. In a color display, each pixel consists of red, green, and blue subpixels, each independently controlled.



6. The liquid crystal can turn transparent or opaque depending on the voltage across it. The brightness of the liquid crystal within a pixel is controlled through transparent conductor pads, generally referred to as pixel electrodes in the industry. In the '002 patent, pixel electrodes are referred to as "contact pads." [The '002 Patent, Fig. 1, item 24; 4:44.] The transparent conductor material is indium-tin oxide (ITO). The frontplane carries a second transparent electrode, which is common to all pixels.

7. I illustrate in Figure 2A a portion of an LCD panel, which consists of several rows and columns of pixel electrodes. An electrical signal applied to a pixel electrode energizes the liquid crystal sandwiched adjacent to the electrode. Thereby, the transparency of the liquid crystal is altered, *i.e.*, the brightness of the corresponding pixel is changed. The liquid crystal transmits or blocks the light from the back light depending on its transparency state. The transparency state is determined by the voltage across the liquid crystal. The charging of the liquid crystal in a pixel is typically implemented and controlled by a pixel transistor: a thin film transistor (TFT).



8. A TFT is used to turn current on or off in the electrical circuit that connects to the pixel electrode. I outline this process in Figure 2B. The pixel electrode, the liquid crystal material, which is essentially insulating, and the common electrode together form a capacitor. A TFT has three terminals: source, gate, and drain. Electrical current may flow in the channel between the source and drain depending on the voltage applied to the gate. Specifically, when the gate voltage is high, the resistance of the source-drain channel is low (ideally zero); in other words, the transistor is turned on. When the gate voltage is low, and the source-drain channel is shut down (ideally with infinite resistance), the transistor is in the "off" state. Thus, by controlling the gate voltage of a TFT, one can switch on or off the electrical pathway between the source and drain of the transistor. That is why a TFT is considered a switching element. When the TFT is on, the liquid crystal capacitor would be charged by the source line to the voltage on the source line. When the TFT is switched off, the voltage is retained on the liquid crystal capacitor.

9. Referring again to Figure 2A, in an LCD panel pixel transistors are controlled by two groups of conductor lines arranged perpendicularly to each other. The horizontal lines, or rows, are often referred to as gate lines. They are also known as "scan lines," as the gate lines are energized sequentially to scan row by row through all the pixels on the display. Each gate line is connected to the gate terminals of all pixel transistors in one row, and is used to control the gate voltage of these transistors. The vertical control lines, or columns, are often referred to as source lines. They are also known as "data lines," as

they conduct data to the TFT source terminals to regulate the brightness of the corresponding pixels. Each source line is connected to the source terminals of all pixel transistors in one column, and thereby controls the voltage applied to the sources for these transistors.

10. In Figure 3, I illustrate graphically the conducting between the source and drain terminals when a sufficient voltage is applied to the gate. Specifically, when a given gate line is activated by bringing it to a high voltage state, the corresponding row of pixel TFTs is turned on, connecting the various source lines to all of the pixels on that row. Figure 3 also indicates the charging of the liquid crystal capacitor described above.

11. The TFTs are susceptible to electrostatic discharge (ESD) damage, especially during the manufacturing of display panels. I include herein a simple illustration of the mechanism of one form of ESD in Figure 4. As shown, this form of ESD is caused by a buildup of electrostatic voltage between the source and gate lines. It damages a TFT by breaking down the insulating barrier between the gate and source, resulting in an ESD surge current between the gate and source. This can result in permanent damage to the gate insulator, and may also result in a short circuit between the associated gate line and source line, rendering the display unusable.

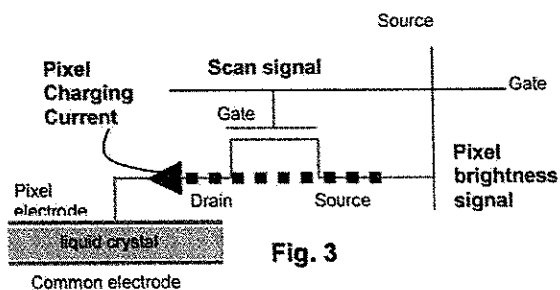


Fig. 3

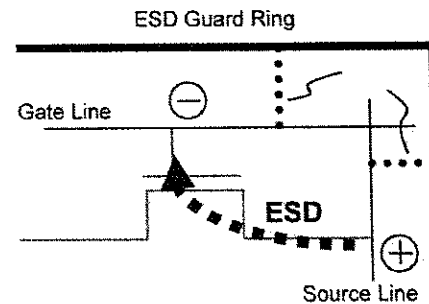


Fig. 4

12. The ESD protective rings were first developed in the semiconductor industry with the advent of metal oxide semiconductor field effect transistors (MOSFETs), which also incorporate gate insulators susceptible to ESD damage.

13. Prior to July 12, 1988, the priority date of the '002 patent, several types of ESD protective rings for LCD panels were disclosed and known to the public. The examples include ESD rings described in Japanese Published Patent Application No. S61-154026 ("JP '026"), and in Japanese Published Patent Application No. S61-30301 ("JP '301"), both of which were filed in 1986.

14. An example of known methods that predate the '002 patent is the use of an ESD guard ring to provide a shunt or bypass for electrostatic discharge between the column and row lines, as shown in Fig. 4. Such ESD protective rings generally have a strip of conductor coupled to both the gate and source lines through "shunts," which are either wires or switching devices. Alternatively, gate lines and source lines have been connected by a layer of resistive material (see, e.g., U.S. Patent No. 4,803,536).

15. Specifically, I include in Figure 5 (A and B) two examples of ESD guard ring configuration known to the public prior to the priority date of the '002 patent. In Fig. 5A, a short connection is maintained between the ESD ring and the row and column lines. [See, JP '301, Fig. 5; Detailed Description, Conventional Technology.] In Fig. 5B, diodes are used to couple the rows and columns to the ESD ring. [See, JP '301, Fig. 2.] Each of the two configurations establishes a bypass for the electrostatic voltage between the rows and columns. In the case of the short connection of Fig. 5A, the ESD ring is described as being disconnected at the end of the manufacturing process. In the case of the connection through diodes illustrated in Fig. 5B, the ESD ring is easily removable. [See, JP '301.] Indeed, the similarity with the ESD guard ring in Fig. 5A strongly

suggests that the ring of Fig. 5B is intended to be removed.

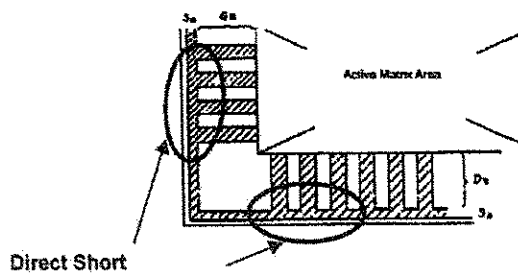
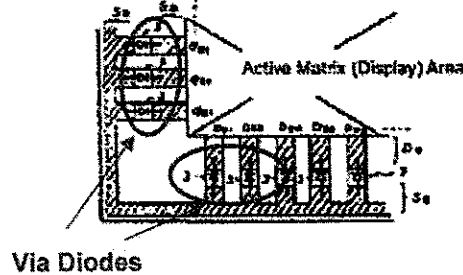


Fig. 5A




19. Second, the '002 patent discloses an outer guard ring. Figure 7 is adopted from Fig. 7 of the '002 patent, and illustrates the outer guard ring, including various connections thereto. As shown, the outer ring consists of conductive lines connected to one or more L-shaped corner pads, located at the corner(s) of the ring and electrically connected with the ring. [The '002 patent, 8:8-11.] The outer ring may be grounded through the corner pads. [The '002 patent, 8:11-12.] They also provide alignment for the scribe lines, which are used "to disconnect the source and gate jumpers and the guard ring after the structure is completed." [The '002 patent, 8:11-16.]

20. It should be noted that the outer ring of the '002 patent is a removable ESD guard ring. Unlike the inner guard ring, the outer guard ring is not coupled to each of the individual source or gate lines, but is coupled to source (or gate) lines that are interconnected together.

21. Plaintiff interprets "interconnecting" as "shorting." The term "shorting" is not a precise term. It is often used in relative terms, as for example, providing a current path with relatively low resistance. In everyday terms, anything that causes a circuit breaker to be activated is considered a "short circuit."

22. The coupling between the outer guard ring and the interconnected rows and columns is made through one or more resistors. The '002 patent uses "resistance" to refer to resistors in this context. [The '002 patent, 8:24-37; 9:5-10; Fig. 7.]

23. I have reviewed the proposed construction by Plaintiff that resistance is "any component used to cause a voltage drop during current flow." This construction is too broad to be useful. Nearly all circuit components can "cause a voltage drop during current flow." Thus, it can apply to any element through which electrical current passes, as current through any element except a superconductor is always associated with a voltage differential. Additionally, if "resistance" can encompass a short wire or a diode, claim 1 would be made obvious by the prior art references disclosing removable ESD rings coupled to rows and columns through conductors or diodes. [See, JP '301.] Further, referring to Fig. 7 of the '002 patent, the "large resistance 228" is labeled by the

symbol, , which is the universal circuit symbol for a resistor. Moreover, in the example of the '002 patent, a 100,000 ohms "resistance" is used. [The '002 patent, 8:23-27.] Assigning a descriptor in ohms implies a simple resistor, *i.e.*, an element for which voltage is proportional to current. For all the foregoing reasons, I do not believe that Plaintiff's construction is accurate. In my opinion, the term "resistance" as used in the '002 patent description should be properly understood to mean "resistor."

24. In the context of electronic circuitry, "removing" an interconnection or an element from the circuit can be achieved by either physically removing the interconnection or the element, or simply breaking the connections. Based on the '002 patent specification, "removing" is not limited to physically removing, because scribe lines are not necessarily for breaking the glass substrate. [See below, ¶ 25.]

25. To my knowledge, the phrase "outer electrostatic discharge guard ring" used in the '002 patent is not in and of itself an ordinary term or a term of art. The term "guard ring" implies that the ring is outside of the active matrix, making "outer" appear to be redundant when looking only at claim 1 by itself. Moreover, the use of "outer" implies to me that there must be an "inner" guard ring.

26. The '002 patent discusses the use of scribe lines. In the semiconductor and LCD industry, scribing refers to tracing a line on the substrate using a sharp tool. Typically, scribe lines can be made either with a soft metal tool to disrupt or disconnect the conductor patterns, or with a diamond or hard metal tool to initiate fracture of the glass substrate or portions thereof for removal.

27. The term "pickup pad" in the '002 patent is not a commonly known term and does not have an established meaning in the semiconductor and display industries. Based on the description of the '002 patent, "pickup pad" appears to mean a pad located at the corner region of a backplane for aligning the frontplane and backplane.


28. The term "corner pad" in the '002 patent is not a commonly known term and does not have an established meaning in the semiconductor and display industries. Based on the description of the '002 patent, "corner pad" appears to mean a pad of metal located at a corner of the glass substrate, connected to the so-called outer guard ring.

Conclusion

29. As discussed in detail above, having completed review of the '002 patent and the '002 patent prosecution history, it is my opinion that the claim terms in the '002 patent should be interpreted consistently with the proposed constructions by CPT as set forth in Defendants' Opening Brief of Their Proposed Claim constructions.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 7th day of March, 2006 in East Palo Alto, California.

By 
Webster E. Howard, Ph.D.

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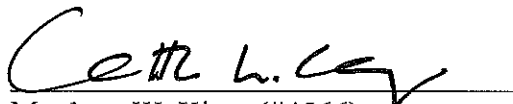
CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on March 8, 2006, I electronically filed the foregoing document with the Clerk of Court using CM/ECF which will send notification of such filing, and hand delivered to the following:

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I hereby certify that on March 8, 2006, I sent the foregoing document by Federal Express, next business day delivery, to the following non-registered participants:

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